Alberta Energy Regulator

Directive 007-1

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Allowables Handbook—Guidelines for the Calculation of Monthly Production Allowables in Alberta

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<original signed by>

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1 Introduction

This directive explains the Alberta Energy Regulator's (AER's) procedures for determining monthly allowables for a production entity (well or block). Allowables or maximum rate limitations (MRLs) are rate controls applied primarily to oil entities in accordance with a Board order. MRLs are assigned to new oil pools when conservation is or could potentially be an issue. MRLs help minimize depletion impacts on oil pools and ensure enhanced oil recovery (EOR) is addressed. MRLs also serve to maintain intrapool equity.

For gas wells, allowables are applied primarily for equity reasons in the administration of off-target penalties (see section 7).

Examples are presented to illustrate overall concepts and procedures, and a glossary is included for reference. All figures cited in the directive appear at the end.

For further clarification on any topic presented in this directive, contact the AER Customer Contact Centre at 1-855-297-8311 (toll free).

1.1 What's New in This Edition

In this edition of *Directive 007-1*, all references to *Directive 019: Compliance Assurance*, which has been rescinded, and related information have been removed.

2 Base Maximum Rate Limitation

The base MRL is the maximum rate of production for a production entity before reduction by any applicable gas-oil ratio or off-target penalties (see section 3). The standard base MRL assigned to a single-well pool is the greater of the reserve-based preliminary rate limitation (PRL) or the basic well rate (BWR) (see figure 1).

- **BWR**—Calculated using the average well depth of all the wells in the pool using the true vertical depth (TVD).
- **PRL**—A pool's PRL is expressed in cubic metres per day (m^3/d) and calculated as the product of a pool's recoverable oil reserves (in units of thousand [10^3] m^3) and the constant 0.296. Continuous production at the PRL rate would deplete a pool's oil reserves in 9.25 years.

For multiwell pools, a well's base MRL is the greater of the BWR or the pool PRL divided by the number of nonabandoned oil wells in the pool.

Base MRL Calculation

Number of nonabandoned wells in the pool = 2

BWR = 10.0 m^3/d/well

Recoverable reserves (RiN) = 98.0 10^3 m^3

Pool MRL = 98.0 × 0.296

= 29.0 m^3/d

$$\text{Well base MRL} = \text{the greater of the BWR or } \frac{\text{pool MRL}}{\text{number of nonabandoned oil wells}}$$

$$= \text{the greater of } 10.0\ m^3/d \text{ or } \frac{(29.0\ m^3/d)}{2}$$

= 14.5 m^3/d

2.1 Nonconfidential Pools—MRL Order

The AER issues a monthly MRL order that lists the MRLs for all active nonconfidential oil pools and indicates whether a pool is subject to good production practice (GPP) or under MRL administration.

MRL orders contain two appendices:

- Appendix I—lists base MRL data on all nonconfidential pools (see figure 2).
- Appendix II (Special Provisions)—provides details on any applicable special requirements prescribed in column 7 of appendix I. Operators producing from pools subject to special provisions must determine whether these provisions apply to the specific production entity they operate.

GPP pools are not restricted by a base MRL or gas-oil ratio (GOR) penalties, but may be subject to special conditions prescribed in appendix II of the MRL order. Operators producing under GPP are expected to produce the wells in accordance with good engineering practices to optimize oil recovery.

MRL orders are posted on the AER website several days before the month it applies to. It is important for operators to refer to the MRL order on a monthly basis to ensure that all relevant data for calculating a given monthly allowable are taken into account. For a description of what each column of the appendix contains, see figure 3.

Monthly Base MRL Calculation—Nonconfidential

Calculation of the monthly base MRL (i.e., unpenalized MRL, or the MRL before any reduction due to penalties [see section 3]) for a well within a defined pool is the product of the MRL in column 5 of appendix I of the MRL order and the number of days in the month.

For example, to calculate the base MRL for a well in the Penny Lwr Banff-Exshaw-BV G Pool in figure 2:

Base MRL from column 5 = 17.5 m^3/d

Number of days in the month = 30 d

Base MRL = Daily base MRL × number of days in the month

= 17.5 $m^3/d \times 30$ d

= 525.0 m^3 for the month

This monthly base MRL may be subject to reduction by any applicable penalties, as described in section 3.

2.2 Confidential Pools—AER Form O-38

Allowables for wells producing from confidential pools are not listed in the MRL order but are listed on AER Form O-38: Application for a New Well Base MRL (see figure 4).

For wells that discover a new pool or are drilled outside existing pool order boundaries, operators must complete Form O-38 and submit it to the Authorizations Branch by e-mail to O38.Applications@aer.ca within 30 days of initial production. If applicable, the AER will assign a base MRL and a base GOR.

Monthly Base MRL Calculation—Confidential Well

Calculation of the base MRL for a single well producing from a confidential pool is the product of the base MRL as indicated on Form O-38 and the number of days in the month.

For example, to calculate the base MRL for a well from Form O-38:

MRL from Form O-38 = 18.0 m^3/d

Number of days in the month = 31

Base MRL = Daily base MRL × number of days in the month

= 18.0 $m^3/d \times 31$ d

= 558.0 m^3 for the month

This monthly base MRL may be subject to reduction by any applicable penalties (see section 3).

Interim MRL

For undefined wells for which an O-38 has not been approved and an MRL has not been assigned, the AER will assume an interim MRL of 8.0 m^3/d and a base GOR of 70 m^3/m^3 following the new oil well production period (NOWPP) (see section 6). Operators with wells that overproduce under an interim MRL and fail to respond to an overproduction notice (see section 5.3) will be subject to a regulatory response in accordance with section 10.280(3) of the *Oil and Gas Conservation Rules* (*OGCR*). An interim MRL will be replaced by the official MRL once an O-38 is submitted and processed.

2.3 Horizontal Well Modifier

The horizontal well modifier (HWM) was designed to encourage, where appropriate, the drilling of horizontal wells rather than multiple vertical wells. When multiplied by the well base MRL, the HWM increases the allowable in relation to the horizontal length of the well.

Rules governing allowables for horizontal wells are as follows:

- The operator must request AER approval of an HWM in writing, usually as part of the O-38 submission.

- The base MRL is equal to the product of the HWM and the base MRL that would be assigned to a vertical well, where

  HWM = square root of (1 + L/100), truncated to one decimal

  L = length of the well's horizontal section in metres, calculated as the difference in log depth from the pay top of the productive zone to the well's total depth (TD) or plugback depth

- During NOWPP, the base MRL is the greater of 20.0 m^3/d or the product of the well base MRL and the HWM, subject to all other conditions of the NOWPP.
- In pools subject to a special MRL, the base MRL is equal to the product of the HWM and the special MRL.
- HWMs are specified in clause 9a of appendix II to the MRL order for nonconfidential pools, and on Form O-38 for confidential pools.

Monthly Base MRL Calculation for a Horizontal Well

For example, using the allowable record for a horizontal well in figure 5, a base MRL calculation for a well assigned an HWM, both during NOWPP and after NOWPP, is as follows:

- Base MRL of a horizontal well during NOWPP:

  NOWPP MRL = 20.0 m^3/d

  HWM = 2.0

  Number of days in the month = 31

  Base MRL = NOWPP MRL × HWM × days in the month

  = 20.0 m^3/d × 2.0 × 31 d

  = 1240.0 m^3 for the month

- Base MRL of a horizontal well on MRL (after NOWPP):

  MRL = 8.0 m^3/d

  HWM = 2.0

  Number of days in the month = 30

  Base MRL = Daily MRL × HWM × days in the month

  = 8.0 m^3/d × 2.0 × 30 d

  = 480.0 m^3 for the month

2.4 Other MRL Considerations

1) Applications for a new well MRL (Form O-38) should be submitted within the first month of production. In the case of horizontal wells, Form O-38 must be submitted unless the entire length of the horizontal section is within the existing AER pool order. If only an enhanced recovery mechanism is listed for a pool in the MRL order, Form O-38 is required to set a primary allowable for a new primary well being drilled into the pool.

2) The Board may assign GPP status for new pools through the O-38 approval process if conservation is clearly not an issue. However, operators must not assume GPP status except if it is specifically authorized in the MRL order. If GPP is not approved through the O-38 process, application for GPP can be made in accordance with *Directive 065: Resources Applications for Oil and Gas Reservoirs*.

3) For a new well to receive the MRL/GPP status prescribed for an existing EOR scheme, the well must be within the scheme's existing approval area as defined for the pool by the AER's EOR approval. To add a new well to an existing EOR approval, an application must be made to expand the scheme's approval boundaries in accordance with *Directive 065*.

4) If a well's fluid classification changes from gas to oil and the well is subject to an MRL, the allowable will be calculated from the effective date of the status change.

5) GPP will normally be granted to wells within the approval area of a new EOR scheme provided that injection is planned to begin within three months of the approval date.

3 Penalties

3.1 Gas-Oil Ratio Penalty

GOR penalties are applied to production entities when the producing GOR exceeds the base GOR. They are imposed to limit production primarily to optimize oil and gas conservation. The base GOR is prescribed in column 6 of appendix I to the MRL order for nonconfidential pools and on Form O-38 for confidential pools.

Base GOR Calculation

The base GOR is determined from the formula below, as set out in Schedule 6 of the *OGCR*:

$$\text{Base GOR } (m^3/m^3) = R_{si} + 1.67\left(\frac{P_b + 101.325}{T + 273.15}\right)$$

where R_{si} = initial solution GOR

P_b = bubble point pressure

T = reservoir temperature

The reservoir parameters used in the formula are determined from pressure volume temperature (PVT) analysis, when available, or from Standings Correlation.

GOR Penalty Factor Calculation

The GOR penalty factor is calculated as the base GOR divided by the producing GOR. The GOR penalty factor is equal to 1.0 when the produced GOR is less than or equal to the base GOR. This penalty factor is then multiplied by the base MRL to determine the adjusted MRL. (Note that the AER reports gas production in units of 10^3 m^3 and oil in units of m^3.)

For example, using the production data below, calculate the GOR penalty factor as follows:

Base MRL (given) = 10 m^3/d

Monthly base MRL (given) = 300 m^3, based on a 30-day month

Base GOR = 130 m^3/m^3

Monthly oil production = 290 m^3

Monthly gas production = 53.7 m^3/m^3

$$\text{Produced GOR} = \frac{\text{Gas production}}{\text{Oil production}} = \frac{53.7\ 10^3\ m^3}{290.0\ m^3} = 185\ m^3/m^3$$

$$\text{GOR penalty factor} = \frac{\text{Base GOR}}{\text{Produced GOR}} = \frac{130\ m^3/m^3}{185\ m^3/m^3} = 0.70$$

Adjusted MRL = monthly base MRL × GOR penalty factor

= 300.0 m^3/month × 0.70

= 210.0 m^3 for the month

3.1.1 Applying the GOR Penalty Factor to the Base MRL

The adjusted MRL for a given month is calculated using the GOR penalty factor from the **third preceding month**. This enables operators to forecast future months' allowables using available production data. For example, when calculating the penalized MRL for April, use the GOR penalty factor from the January production data. If there is no production in the third preceding month (January), use the second preceding month (February). If there is no production in the second preceding month (February), use the first preceding month (March). Use the current month's GOR penalty factor against that month and the following three months if there has been no production over the previous three months or if the production entity is subject to any of the following changes:

- a change in the base GOR,
- the commencement of gas conservation for gas subject to net GOR penalty relief,
- the first month after NCRI PP,
- the first month after production test,
- the formation of a new Block, or
- a GPP or net GOR penalty relief that has been rescinded or expired.

If an entity has been shut-in to retain overproduction and the cumulative overproduction status has not been reduced to zero by the end of the third consecutive shut-in production month, then from the fourth consecutive shut-in month and thereafter retirement will be calculated at the unpenalized MRL (i.e., no GOR penalty).

3.1.2 Net GOR Penalty Relief

Where gas is conserved and upon successful application, the AER may grant relief from GOR penalties based on net gas production. Application for net GOR penalty relief is made under section 10.006 of the *OGCR*. If in accordance with Directive 060:

If net GOR penalty relief is granted, the net produced GOR is calculated on the volume of gas flared and vented, not on the month's total gas production. If the net produced GOR is less than the base GOR, the net GOR penalty factor is equal to 1.0:

$$\text{Net produced GOR} = \frac{\text{Gas flared + vented}}{\text{Oil production}}$$

$$\text{Net GOR penalty factor} = \frac{\text{Base GOR}}{\text{Net produced GOR}}$$

Multiwell facilities must prorate the battery flared/vented volume to individual wells based on their prorated share of total battery production as reported through the volumetric submission to Petrinex:

$$\text{Well's gas flared/vented} = \frac{\text{Well's gas production (total battery flared + vented)}}{\text{Total battery gas production (excludes other receipts)}}$$

3.2 Off-Target Penalty

Where a well is completed outside its prescribed target area, an off-target penalty factor may be imposed against the base MRL. The following conditions apply to off-target penalties:

1) An operator is responsible for the surveillance of any well that may be drilled off-target towards its wells. An off-target penalty will be assessed upon successful application from a competitive operator in accordance with section 4.060 of the *OGCR*.

3) If a well is spudded on or after April 1, 1996, and a dry-hole well or a good off-target production are not applied, the oil wells due "dry-hole well" is the well or a good with the authorized good date and which was placed on production within six months of its good date (sections 2.090(1) and (2) of the OGR 08).

5) The off-target penalty factor (as described in Schedule 1.01 of the OGR 08) is always applied to the base VER, then determined by any applicable OGR penalties.

6) Off-target penalties may be applied during RECKON.

7) The off-target penalty factor normally does not reduce the base VER (where 1.0 or 1.0).

8) For GOP goods, the VER determines the new against which to apply the off-target penalty based on the reported capability of the offloading and other wells in the pool.

9) Off-target penalties in effect for goods on GOP status are listed in clause 1 and for VER goods in clause 8 of appendix 8 of the VER, under or as per VER rules of disposition.

10) Upon successful application for removal of the off-target penalty of a production entity, to an VER good, in accordance with clause 4(4), the off-target penalty will no longer be applied and the entity will continue under normal VER administration.

11) Upon successful application for removal of the off-target penalty of an entity in a GOP pool, any outstanding cumulative overproduction must be cleared in the good production proration assessment rate (GPR) (see section 7.3).

VER: Calculations for an off-target well

For example, using the data below, calculate the adjusted VER for an off-target well with the applicable OGR penalty factor as follows:

Daily based VER = (4.0 m^3) d

Off-target penalty factor = 0.25

OGR penalty factor = 0.60

Number of days in the month = 31

Monthly base VER = Daily base VER x number of days in the month

= (4.0 m^3) d x 31 d/mo

= 124.0 m^3/mo

[redacted]

[redacted]

[redacted]

6 Overpayment

The CMS system is administered by persons in various salary subgroups, which are broadly grouped into Executive Officers and Managers. The CMS considers overpayment to be any remuneration in excess of the stipulated CMS for a predetermined salary. The CMS recognises that certain overpayments may result from time to time and therefore does not impose a penalty. Overpayment is less than 10 per cent of the stipulated CMS. An overpayment of the remainder is taken into account and the service benefit is recalculated, including any penalty.

To discourage overpayment, the CMS applies an overpayment penalty to any overpayment salary. The overpayment amount 10 per cent of the stipulated CMS. Furthermore, a pension cannot consist of overpayment. An CMS cannot that all overpayments are overpayments, resulting in an over-payment salary (stipulated CMS) should be corrected retrospectively and capped to the end of the third month following the first month of overpayment. If overpayment is corrected, rendering it less than the stipulated CMS, a reading in the end to the deadline following overpayment.

Note that overpayment in any month is paid to office NC (previous month's overpay) except for final salary. Return of overpayment may not be carried forward to any of later months (see 4 during CMS).

6.1 Overpayment Penalty

6.1 If per cent overpayment penalty is assessed and month that the monthly overpayment exceeds 10 per cent of the stipulated CMS. The penalty is calculated as 10 per cent of the difference between the reported monthly overpayment and 10 per cent of the stipulated CMS. All overpayments, including penalties, must be settled within three months from overpayment exceeds 10 per cent of the stipulated CMS.

Overpayment Penalty Calculation

Using the following data from the officer's overtime shown in figure 1:

Monthly remuneration = [illegible]

Monthly stipulated CMS = [illegible]

Calculate the monthly overpayment penalty as follows:

Monthly overpayment = monthly remuneration − stipulated CMS

= [illegible] − [illegible]

= [illegible]

[illegible] = [illegible] − [illegible] × 0.3)

= [illegible] × 0.3)

= [illegible]

[illegible] = [illegible] − [illegible] × 0.3)

= [illegible] − [illegible] × 0.3)

= [illegible]

Using the following data from the case figure:

[illegible] = [illegible]

[illegible] = [illegible]

The cumulative value for September 2019 is calculated as follows:

[illegible] = [illegible] + [illegible] + [illegible]

= [illegible] + [illegible] + [illegible]

= [illegible]

(iv) [illegible]

When a change in the cost of [illegible] determines the level support at an outstanding [illegible] and [illegible] is [illegible] [illegible] [illegible] [illegible] support at [illegible] of the outstanding [illegible] [illegible] [illegible] [illegible]

Producing hours (August–November) = 696 + 720 + 704 + 720 = 2840 hours
(as reported in the volumetric submission to Petrinex)

GPP Granted = January 2016

The GRR would be calculated as follows:

$$\text{GRR} = \frac{\text{Production from months overproduced}}{\text{Producing hours from the months overproduced}} \div 24 \text{ hours/day (hr/d)}$$

$$= \frac{11{,}213.0 \text{ m}^3}{2840 \text{ hours}} \div 24 \text{ hr/d}$$

$$= 9.5 \text{ m}^3/\text{d}$$

If a well is overproduced during its NOWPP, the GRR is calculated based on the month(s) the well's cumulative production exceeds the total NOWPP allowable. For example, using the data from the allowable record in figure 7:

Total NOWPP allowable = 2 800.0 m³

NOWPP months = August, September, October, November

Cumulative production (August–November) = 500 m³ + 800 m³ + 800 m³ + 1500 m³

= 3600 m³

Month that cumulative production exceeds the total NOWPP allowable (2 800 m³) = November

GPP granted = December

November production = 1500 m³

November hours = 720 (as reported in the volumetric submission to Petrinex)

The GRR for a well within NOWPP is calculated as follows:

$$\text{GRR} = \frac{\text{Production from month in which cumulative production exceeds NOWPP allowable}}{\text{Producing hours from the month in which cumulative production exceeds NOWPP allowable}} \div 24 \text{ hr/d}$$

$$= \frac{\text{November production}}{\text{November hours}}$$

$$= \frac{1500 \text{ m}^3}{720 \text{ hours}} \div 24 \text{ hr/d}$$

$$= 50.0 \text{ m}^3/\text{d}$$

5.3 Cumulative Overproduction

To ensure a level playing field for all operators and to promote a more timely settlement of overproduction, the ARR requires the operator of a production entity to retire (to zero status) all

cumulative overproduction exceeding 10 per cent of the adjusted MRL by the end of the third month following the first month of overproduction.

Using the data within figure 8, the following example illustrates an overproduced well:

Production month	Status	Months overproduced	Cumulative overproduction status	Comments
August 2015		0	15.5 m^3	Well cumulative status (15.5 m^3) is <10% of the adjusted MRL of 248.0 m^3, or 24.8 m^3.
September 2015	Notification	1	107.5 m^3	Well cumulative overproduction status is >10% of the adjusted MRL of 224.0 m^3 or 22.4 m^3. All overproduction must be retired (to zero status) within three months (December 31, 2015). If cumulative overproduction status is not at zero status, then well must be shut in by January 1, 2016.
December 2015	Notice of noncompliance (shut-in)	4	165.4 m^3	Well cumulative status not reduced to zero status by December 31, 2015.

5.4 Allowable Record

The AER maintains an allowable record for each production entity on MRL. Terms of an allowable record are described in figure 8. This record should be used as a basis for comparison with the operator's own records. An operator is responsible for correctly maintaining allowable records for the wells it operates. Allowable records for all nonconfidential production entities are available to the public from AER Information Distribution Services (call 1-855-297-8311 [toll free] or e-mail InformationRequest@aer.ca). Allowable records for all confidential production entities are available to the current operator (the company reporting the production data on Petrinex).

5.5 Waiver of Overproduction

The AER may grant a waiver of overproduction in unique situations if an operator can demonstrate in writing that retiring the overproduction would compromise conservation. Direct requests for waivers of overproduction to the Authorizations Branch.

6 New Oil Well Production Period

NOWPP provides new oil wells with operational flexibility to gather production data on new wells subject to the following conditions:

1) NOWPP consists of the first four producing months and commences with either the first month in which there is new oil production or the on-production month reported through the well status change on Petrinex, whichever occurs first.

2) Base MRL during NOWPP is the greater of 20.0 m^3/d or the reserve-based MRL.

3) NOWPP is considered as a single production period for overproduction administration, meaning that underproduction may be carried forward within NOWPP.

4) NOWPP expires one year from the on-production month.

5) GOR and overproduction penalties are not applied during NOWPP; however, any overproduction incurred during this period must be retired.

6) Off-target penalties may be applied during NOWPP.

7) The GOR of the first producing month after the expiration of NOWPP is used to determine the GOR penalty factor for that month and the following three months.

8) New wells completed within a block are not eligible for NOWPP.

9) Upon written notification to the Authorizations Branch, shut-in month(s) within NOWPP may be counted as producing month(s) to reduce overproduction.

10) For horizontal wells producing under NOWPP, the MRL is the product of the MRL and the HWM.

11) Upon written request to the Authorizations Branch, the AER may delay the commencement of NOWPP if an oil well is flaring for the purpose of testing, cleanup, or completion to obtain data for economic evaluation and for sizing equipment at new oil batteries. Flaring must be in the first month of production and should not exceed a total of 72 hours, in accordance with *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*. The well must remain shut in after the 72 hour test until the gas is tied in and conserved. These requests will only be considered after the gas is being conserved.

7 Gas Allowables

A gas well is normally permitted to produce unrestricted and in accordance with good engineering practices. However, there are three situations when the AER may issue a gas allowable (GA) order for the purpose of setting the maximum cumulative gas production or gas production rate for a gas well or wells in a pool:

- when the ultimate recovery of gas may be adversely affected by unrestricted production rates (section 10.300(1) of the *OGCR*);
- when a gas well is completed outside of its prescribed target area and upon successful

application from an offsetting operator to apply an off-target penalty to the well's base allowable (section 4.070(1) of the *OGCR*);

- when the AER has approved a fractional section as a DSU and there is a need to apply an area-ratio production penalty or off-target penalty for equity reasons (section 4.050 of the *OGCR*).

If a well is spudded on or after April 1, 1994, and is the first well in a pool, off-target penalties are not applied. For gas wells, the "first well" is the well in a pool with the earliest spud date that is completed and for which a suitable test has demonstrated that the well has the ability to produce gas at commercial rates on a sustained basis (sections 4.060(5) and (6) of the *OGCR*).

Section 10.095 of the *OGCR* designates that the base allowable for a gas well is its maximum daily allowable (Q_{max}). The calculation of Q_{max} is explained in section 10.300(1)(c) of the *OGCR*. Penalties are applied against the well's Q_{max} and an annual allowable is assigned based on this Q_{max} and the number of days in the allowable year or remaining in the allowable year.

The assigned allowable for an off-target gas well, fractional section DSU, or well(s) in a pool for conservation reasons is effective the date given in the disposition letter. Allowables assigned by letter are coalesced into a GA order issued each year in January and updated quarterly throughout the allowable year. The penalty factor and Q_{max} for confidential wells will be assigned by disposition letter only.

An annual pressure survey must be submitted by November 1 for an allowable to be assigned for the following allowable period (commencing January 1). Failure to submit a pressure test by November 1 will result in the assignment of an allowable of zero for the next allowable period.

To discourage overproduction, the AER applies a penalty to any gas well if the cumulative overproduction exceeds 10 per cent of a well's allowable. If a well is overproduced, the AER will increase the overproduction status by an amount equal to 0.5 times the overproduction in excess of 10 per cent of the allowable. The overproduction status of a well is determined after the production data for the month of December have been filed with the AER. The allowable calculated for the next allowable period will then be adjusted to reflect the overproduction and any overproduction penalty from the previous allowable period. The adjusted (penalized) allowable will be communicated by letter to licensees of overproduced wells after the annual GA order is issued.

If, due to changes in the *OGCR*, a gas well that was previously off target and subject to penalties is no longer off target, the licensee may apply in accordance with section 3.6 of *Directive 065* to have the off-target penalty removed, provided that all cumulative overproduction has been retired.

The gas well licensee is required to shut in wells once the annual gas allowable has been reached. Wells that overproduce their annual assigned gas allowable will be given notice by the AER requiring immediate shut-in of the well. Failure to shut in the well after receiving an AER notice

will result in a regulatory response pursuant to the *OGCR*, section 10.280(3). Wells that overproduce must remain shut-in until all overproduction including penalties has been retired.

Direct any questions concerning gas allowables to the AER Customer Contact Centre at 1-855-297-8311 (toll free).

Overproduction Penalty Calculation for a Gas Well

The overproduction penalty for the end of the accounting period is calculated as follows:

Annual allowable = 25 000.0 10^3 m^3

Annual production = 35 000.0 10^3 m^3

Overproduction = production − allowable

= 35 000 10^3 m^3 − 25 000 10^3 m^3

= 10 000 10^3 m^3

Production subject to penalty = overproduction − 10% allowable (25 000 10^3 m^3)

= 10 000 10^3 m^3 − 2500 10^3 m^3

= 7500 10^3 m^3

Penalty = production subject to penalty × 0.5

= 7500 10^3 m^3 × 0.5

= 3750 10^3 m^3

Status at next accounting period = overproduction + penalty

= 10 000 10^3 m^3 × 3750 10^3 m^3

= 13 750 10^3 m^3

8 Glossary

Adjusted maximum rate limitation (MRL) or allowable
The MRL of production for a production entity after penalty factors have been applied.

Base maximum rate limitation (base MRL)
The amount of production that, according to a Board order, can be taken prior to any applicable penalty factors being assessed.

Base gas-oil ratio (base GOR)
Defined in Schedule 6 of the *OGCR* using the formula

$$\text{Base GOR } (m^3/m^3) = R_{si} + 1.67\left(\frac{P_b + 101.325}{T + 273.15}\right)$$

Block
An area or part of a pool consisting of wells grouped for the purpose of obtaining a common aggregate production allowable.

Cumulative overproduction status
The sum of all previous months' overproduction plus the current month's overproduction, including any penalty.

Enhanced oil recovery (EOR) approval area
The area of a pool recognized as being operated under enhanced oil recovery.

Gas allowable
The maximum cumulative gas production that, according to a Board order, could be taken in the prescribed time period.

Gas-oil ratio (GOR)
The monthly gas production divided by the monthly oil production.

Gas-oil ratio penalty factor (GOR penalty factor)
The base GOR divided by the produced GOR.

Good production practice (GPP)
When production is not governed by a base allowable but is conducted in accordance with sound engineering principles.

Good production practice retirement rate (GRR)
The rate at which overproduction is retired once GPP is approved.

Horizontal well modifier (HWM)
A factor greater than 1.0 that is assigned to a horizontal well and applied to the base MRL.

Licensee
For gas allowable purposes, the licensee of record is responsible for the overproduction.

Net gas-oil ratio (net GOR)
The ratio of monthly volume of gas flared and/or vented divided by oil production.

Net gas-oil ratio penalty factor (net GOR penalty factor)
The base GOR divided by the net GOR.

Off-target
A well that is completed outside its prescribed target area pursuant to the *OGCR*.

Off-target penalty factor	A factor less than 1.0 that is applied against the base MRL for an off-target well.
Operator	For oil allowable purposes, the operator is considered the party reporting the production data to Petrinex and is responsible for the overproduction.
Overproduction	Any production in excess of the adjusted MRL.
Preliminary rate limitation (PRL)	The initial determination of a pool's base MRL based on pool reserves.
Q_{max}	The maximum daily allowable of a gas well, determined in accordance with section 10.300 of the *OGCR*, that is used to calculate the maximum cumulative production for a penalized gas well.
Target area	The part of a drilling spacing unit (DSU) within which a well may be completed for the purpose of producing oil or gas without reducing its allowable because of its location.

9 Data Precision

The number of decimal places to be used in calculations is as follows:

Table 1. Number of decimal places to be used in calculations

Items	# of decimal places
Adjusted MRL	1
Base GOR	0
BWR	1
Cumulative overproduction status	1
Daily MRL	1
Gas flared/vented	1
GOR	0
GOR penalty factor	2
GRR	1
HWM	1
Monthly oil/gas production	1
Monthly overproduction penalty	1

When rounding, add five to the last digit and then drop the last digit of the sum.

Schedule 5

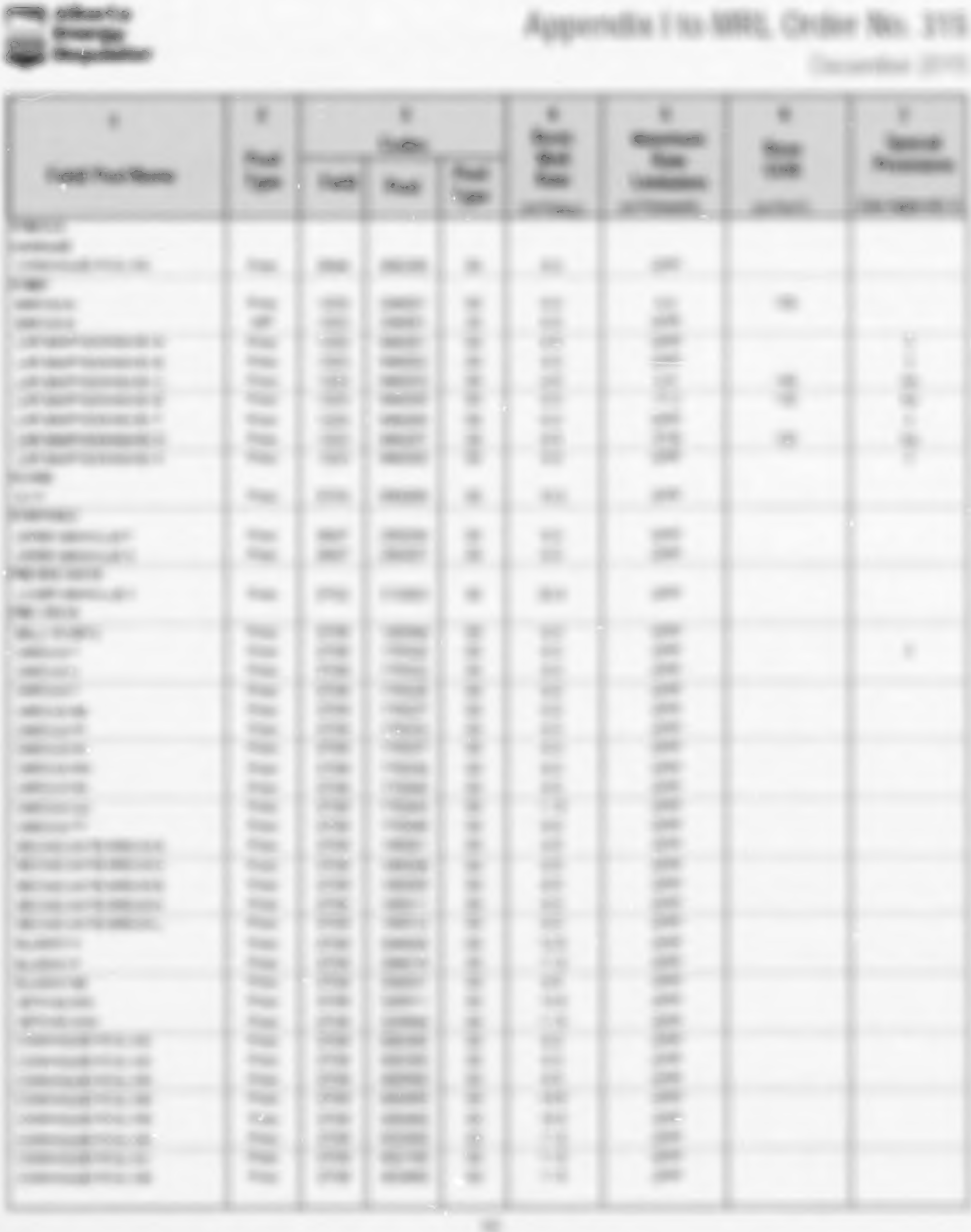
Tabulation of Basic Well Rates

Effective 1 February 1994

Pool Average Well Depth – M	Basic Well Rate – m^3 per day
to 2000	8.0
2001-2100	8.5
2101-2170	9.0
2171-2230	9.5
2231-2290	10.0
2291-2340	10.5
2341-2395	11.0
2396-2440	11.5
2441-2495	12.0
2496-2530	12.5
2531-2570	13.0
2571-2610	13.5
2611-2650	14.0
2651-2690	14.5
2691-2730	15.0
2731-2760	15.5
2761-2790	16.0
2791-2820	16.5
2821-2850	17.0
2851-2880	17.5
2881-2910	18.0
2911-2940	18.5
2941-2970	19.0
2971-3000	19.5
3001 and deeper	20.0

AR 151/71 Sched. 5;149/72;229/79;264/94

Figure 1. *Oil and Gas Conservation Rules*, Schedule 5, Tabulation of Basic Well Rates



Appendix I to MRL Order No. 315

December 2015

Figure 6. Example of appendix I to the MRL order

Indicator	Definitions
1	Frontplane names as defined by this ISDN
2	Port type – recovery mechanism for the port (codes): a. PUR – Primary Upgrades (4G) b. SP – Standard Ports (1G) c. MP – Middle Ports (2G) d. PP – Premium Ports (3+) e. UP – Ultra Ports (5G) f. SUP – Rural Surfboards Polyimide Ports (7G)
3	Field, good, and point type codes as defined by this ISDN
4	Basic Well Rate (BWR) – the nearest unannotated MRI, assigned in processing an well in a port in card type, subject to the average well depth of the port, as tabulated in Schedule 3 of this ISDN (see figure 1).
5	Maximum Rate Limitation (MRL) for the cycle a well drew a card type, worth an UPP are not subject to an MRL, unless otherwise specified in appendix 2 of this MRL, case or entities that are within a controlling interconnection under MRR from previous MRL administration.
6	Base ISDN pa calculated in accordance with Schedule 2 of this ISDN.
7	Special provisions applicable to wells in its individual cycles: a. a port type (the specific classes are described in appendix 1 of this MRL order).

Figure 6: Descriptions of round columns in appendix I to the ISDN, ...tps

Figure D: [illegible]

Application for a New Well Base (WB)

For confidential wells and unaffiliated areas only

Alberta Energy Regulator

Well name

Unique well identifier

Unit

Part

Township

UTM location

m

Producing/Drilling code

Non-producing code

Well identifier	Type			Wells	Perforated interval	Target zone	Base of groundwater	Lithology	Depth of fill	Recovered depth

Wellbore to be completed

Kick off point (KOP)

Vertical depth

Measured depth

Build rate (BR) (°/)

Azimuth

Dip

A

Y-dist

Max

D

R

Max

T_0

M_0

T_1 m

Inclination

Target radius

Tolerance

Surface hole

Surface location

Projection

Target

Bottom hole

Bottom hole location

Producing formation

Spacing unit

Spacing unit description

Drilling window

Unit

Base WB

Well

Base KOP

Kick off point

Base WB

Bottom hole

Non-orthogonality

Surface land use zone

Remarks

Alberta Energy Regulator

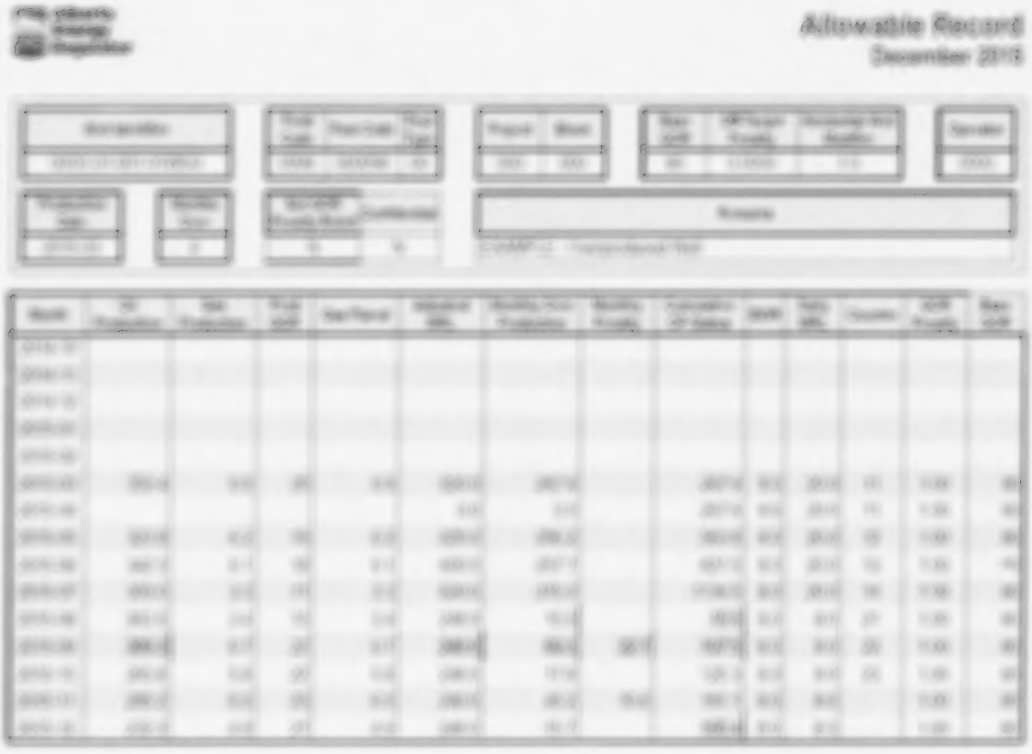
Date approved

AER use only

Alberta Energy Regulator

[illegible]

Figure 41. Offshore wind LCOE in AEO2021 cases



Allowable Record
December 2013

Figure 6. Allowable record with overproduction calculation

Allowable Record
December 2015

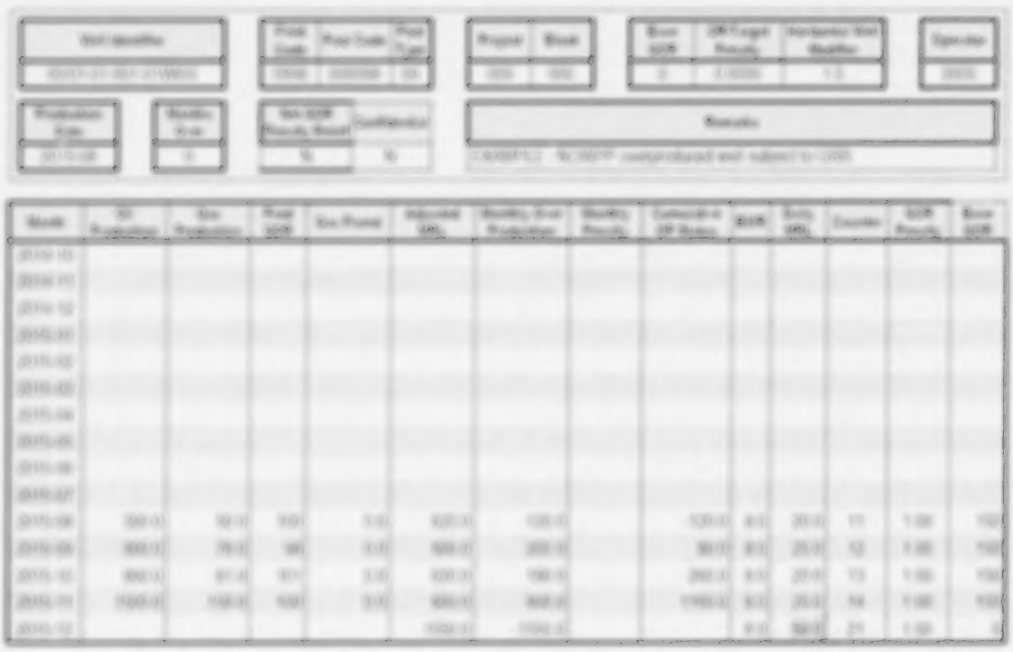


Figure 7. Allowable record with GRR calculation under NOMPP

Terms	Definitions
Horizontal well modifier (HWM)	HWM is a factor assigned to the MRL of a horizontal well. For vertical wells, the HWM is shown as 1.0.
Operator	Code of the operator of the production entity and one who is responsible for any overproduction. For allowable purposes, operator is the company reporting the production data.
Production date	The earlier of the well's on-production date as specified on the well status change on Petrinex or the date of first production.
Months over	Number of months the cumulative overproduction status exceeds 10% of its adjusted MRL or when overproduction is not retired after exceeding 10% of the adjusted MRL.
Net GOR penalty relief	GOR penalty relief, where the GOR penalty is based only on the flared/vented gas volumes.
Confidential	Confidential status of the well.
Gas flared	Volume of gas flared or vented.
Adjusted MRL	Monthly MRL for the production entity after all applicable penalties.
Monthly overproduction	Difference between the adjusted MRL and oil production.
Monthly penalty	Penalty assessed on overproduction exceeding 10% of the monthly adjusted MRL.
Cumulative overproduction status	Sum of previous and current month's overproduction, including any penalty.
Counter	Code in the Allowable Record for AER use for calculation of the adjusted MRL.
GOR penalty	Penalty factor assessed against the base MRL when an entity's producing GOR exceeds the base GOR.

Figure 8. Terms on an allowable record